

Abstract Submitted  
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**Canonical Sectors and Evolution of Firms in the US Stock Markets**<sup>1</sup> LORIEN HAYDEN, RICKY CHACHRA, ALEXANDER ALEMI, PAUL GINSPARG, JAMES SETHNA, Cornell University — In this work, we show how unsupervised machine learning can provide a more objective and comprehensive broad-level sector decomposition of stocks. Classification of companies into sectors of the economy is important for macroeconomic analysis, and for investments into the sector-specific financial indices and exchange traded funds (ETFs). Historically, these major industrial classification systems and financial indices have been based on expert opinion and developed manually. Our method, in contrast, produces an emergent low-dimensional structure in the space of historical stock price returns. This emergent structure automatically identifies “canonical sectors” in the market, and assigns every stock a participation weight into these sectors. Furthermore, by analyzing data from different periods, we show how these weights for listed firms have evolved over time.

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